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Fe are to each other as 72 : 56, Mg is in excess, and the substance crystallizes as does $MgSo_4 + 7H_2O$. In compounds containing less Mg (as $2MgSo_4 + FeSo_4) + 7H_2O$, the proportions of Mg and Fe are as 48 : 56, and the crystallization is that of melanterite. Various conditions effect the crystallization of mixed bodies, but the most important of these, according to Schrauf's opinion, is the one mentioned above. If this law is found to be general in its application, the present views in regard to the dimorphism of many compounds belonging to the so-called iso-dimorphous groups will have to be modified.

## BOTANY.[1]

**Botanical Manuals for Students.**—Nowadays we are urging students to collect and study plants from all the great groups, and thereby to familiarize themselves with the vegetable kingdom as a whole, but perhaps we too often overlook the difficulties which lie before them. Not the least of these is the want of systematic manuals in which descriptions of the genera and species may be found. It is all very well to tell a student that the name and technical description are of much less importance than is the knowledge of structure and habits. It is true, no doubt, but, for all that, there is need of such works in every laboratory, to serve *as guides*, if for no other purpose. Unfortunately for the American student, we are as yet poorly supplied with descriptive manuals. In the following list I have enumerated the classes (and in some cases the orders under the classes) of the several great branches of the plant kingdom, giving for each the name of a useful systematic manual. I have not attempted to make a list of the works of this kind which are *absolutely the best*, for too often such works are too expensive for the limited means of the botanical departments of many schools and colleges.

### PROTOPHYTA.

MYXOMYCETES.—Cooke's Myxomycetes of Great Britain.

SCHIZOMYCETES.—Grove's Bacteria and Yeast Fungi.

CYANOPHYCEÆ.—[2] Cooke's British Fresh-Water Algæ, pp. 203–282, and, doubtfully, pp. 1–30.

### ZYGOPHYTA.

ZOOSPOREÆ.—Cooke's British Fresh-Water Algæ, pp. 67 (Pandorina), 35–49 (Hydrodictyon, etc.), 135–145 (Confervaceæ); and Farlow's New England Algæ, pp. 41–44 (Ulvaceæ), and 61–98 (Phæosporeæ).

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[1] Edited by Prof. CHARLES E. BESSEY, Lincoln, Nebraska.

[2] During the year the work on the "Fresh-Water Algæ of North America," by Francis Wolle, may be expected. When that appears it should be substituted for the "British Fresh-Water Algæ" wherever the latter occurs in this list.

CONJUGATÆ.—*Desmidiaceæ.* Wolle's Desmids of the United States.
*Diatomaceæ.* Van Heurck's Synopsis des Diatomées de Belgique.
*Zygnemaceæ.* Cooke's British Fresh-Water Algæ, pp. 74–110.
*Mucorini.*[1] Winter's Rabenhorst's Kryptogamen Flora.

## OÖPHYTA.

ZOOSPOREÆ.—Cooke's British Fresh-Water Algæ, pp. 56–67 (Volvox, etc.), 132–134 (Sphæroplea).

ŒDOGONIEÆ.—Cooke's British Fresh-Water Algæ, pp. 148–177.

CŒLOBLASTEÆ.—*Vaucheriaceæ.* Cooke's British Fresh-Water Algæ, pp. 115–126.
*Saprolegniaceæ.*[1] Winter's Rabenhorst's Kryptogamen Flora.
*Entomophthoreæ.* Winter's Rabenhorst's Kryptogamen Flora, pp. 74–79.
*Peronosporeæ.* Farlow's Peronosporeæ of the United States.

FUCACEÆ.—Farlow's New England Algæ, pp. 99–104.

## CARPOPHYTA.

COLEOCHÆTEÆ.—Cooke's British Fresh-Water Algæ, pp. 195–197.

FLORIDEÆ.—Farlow's New England Algæ, pp. 106–183.

ASCOMYCETES.—*Perisporiaceæ.* Bessey's Erysiphei.
*Tuberaceæ.* Cooke's Hand-Book of British Fungi, pp. 738–750.
*Helvellaceæ.* Cooke's Hand-Book of British Fungi, pp. 655–737.
*Pyrenomycetes.* Winter's Rabenhorst's Kryptogamen Flora, vol. ii.[2]
*Lichenes.* Tuckerman's North American Lichens.
*Uredineæ.* Burrill's Parasitic Fungi of Illinois.
*Ustilagineæ.* Winter's Rabenhorst's Kryptogamen Flora, pp. 79–131.

BASIDIOMYCETES.—Winter's Rabenhorst's Kryptogamen Flora, pp. 270–922, and Cooke's Hand-Book of British Fungi, pp. 1–376, and 409–413.

CHARACEÆ.—Halsted's American Species of Characeæ.

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[1] The orders Mucorini and Saprolegniaceæ have not yet been reached in the publication of the "Kryptogamen Flora," but no doubt they will be soon.

[2] Not yet quite completed.

## BRYOPHYTA.

HEPATICÆ.—Underwood's North American Hepaticæ.

MUSCI.—Lesquereux and James's Mosses of North America.

## PTERIDOPHYTA.

Underwood's Ferns and their Allies.

## PHANEROGAMIA.

There is no complete Phanerogamic Flora of the United States. The Gamopetalæ have been completed in Gray's "Synoptical Flora of North America." For the remaining flowering plants we must make use of the various local Floras, as follows:

For the Northeastern United States (*i.e.*, north of North Carolina and Tennessee, and west to the Missouri River), Gray's "Manual of Botany." For the Southeastern United States (*i.e.*, south of the preceding, and west to the Mississippi River), Chapman's "Flora of the Southern United States." Wood's "Class-Book" is intended to include all the Phanerogams of both the foregoing regions. For the region west of the Sierra Nevada Mountains, Watson's "Botany of California," or Rattan's "Popular California Flora." For the Rocky Mountains and the Plains, Coulter's "Manual of Rocky Mountain Botany." Strictly speaking, Coulter's Manual is intended to cover Colorado, Wyoming, Montana, Western Dakota, Western Nebraska, and Western Kansas, but its usefulness extends a couple of hundred miles farther in every direction. The Great Basin of Utah and Nevada and the Arizona-Texas region have no manuals as yet. For these regions Watson's "Catalogue of the Known Plants of Nevada and Utah" (*U. S. Geol. Explor. of the 40th Parallel*, vol. v.) and Rothrock's "Catalogue of the Plants collected in Nevada, Utah, Colorado, New Mexico, and Arizona" (*U. S. Geog. Surveys West of the 100th Meridian*, vol. vi.) will render good service.

Full titles of most of the foregoing works are given below, with approximate prices:

The Myxomycetes of Great Britain. M. C. Cooke. London, Williams & Norgate. $2.50.

A Synopsis of the Bacteria and Yeast Fungi. W. B. Grove. London, Chatto & Windus. $1.25.

British Fresh-Water Algæ. M. C. Cooke. London, Williams & Norgate. $22.00.

Marine Algæ of New England. W. G. Farlow (Rept. U. S. Fish Commission, 1879). Washington. $2.50.

Desmids of the United States. Francis Wolle. Bethlehem, Pa. $5.00.

Synopsis des Diatomées de Belgique. Henri van Heurck. Anvers. $50.00.

Rabenhorst's Kryptogamen Flora: Die Pilze. George Winter. Leipzig. Ed. Kummer. $16.00.

Enumeration of the Peronosporeæ of the United States. W. G. Farlow. *Botanical Gazette*, Oct. and Nov., 1883.

On Injurious Fungi: The Blights (Erysiphei). C. E. Bessey. Seventh Biennial Rept. Iowa Agricultural College, 1877.

Hand-Book of British Fungi. M. C. Cooke. London, Macmillan & Co. $12.00.

A Synopsis of the North American Lichens. Ed. Tuckerman. Boston, S. E. Cassino. $3.00.

Parasitic Fungi of Illinois: Uredineæ. T. J. Burrill. Bulletin Ill. State Laboratory of Nat. History, vol. ii., 1885.

Classification and Description of the American Species of Characeæ. B. D. Halsted. Proc. Boston Soc. Nat. History, vol. xx., 1879.

Descriptive Catalogue of the North American Hepaticæ North of Mexico. L. M. Underwood. Bulletin Ill. State Laboratory of Nat. History, vol. ii.

Manual of the Mosses of North America. L. Lesquereux and T. P. James. Boston, Cassino & Co. $4.00.

Our Native Ferns and their Allies. L. M. Underwood. Bloomington, Ill. $1.25.

Synoptical Flora of North America. Asa Gray. New York, Ivison, Blakeman, Taylor & Co. $6.00.

Manual of the Botany of the Northern United States. Asa Gray. Same publishers. $2.00.

Flora of the Southern United States. A. W. Chapman. Same publishers. $4.00.

Manual of the Botany of the Rocky Mountain Region. J. M. Coulter. Same publishers. $1.85.

Class-Book of Botany. A. Wood. New York, Barnes & Co. $3 50.

Botany of California. S. Watson. Cambridge, Mass., Welch, Bigelow & Co. $10.00.

A Popular California Flora. V. Rattan. San Francisco, Bancroft & Co. $1.00.

The two government reports (Watson's and Rothrock's) cannot probably be obtained from the government offices any longer. They may be bought of second-hand dealers for from $3.00 to $5.00 each.—*Charles E. Bessey.*

**The Eighteenth and Nineteenth Centuries of North American Fungi.**—About the middle of March these two centuries were received by subscribers from the hands of the authors, Messrs. Ellis and Everhart. Century XVIII. is notable for the great number of difficult micro-fungi which it contains. Thus, of the genus Cercospora there are specimens of thirty-four species; of Septoria, twelve; of Phyllosticta, seven; and of Sphærella, four. The larger fungi are represented by fine specimens of half a dozen Polypori. Trametes, Hydnum, Radulum, Grandinia, Merulius, Hymenochæte, Stereum, Corticium, Næmalelia, and Exobasidium are represented by one or more species each,—that of the genus last named being the striking *E. discoideum* of Ellis, found on "the under-side of living leaves of *Azalea viscosa*."

Century XIX. is mainly devoted to the Uredineæ, there being no less than twenty-three species of Æcidium, twenty-eight of Puccinia, and sixteen of Uromyces, besides eight more of various genera, making a total of seventy-five. The remaining species are divided among eight or nine genera, of which Ustilago includes six, Peronospora three, Cystopus two, and Entomophthora two. It is scarcely necessary to say that the specimens are highly satisfactory.—*Charles E. Bessey.*

**Tomato-Rot.**—Dr. J. C. Arthur has been studying tomato-rot, and ascribes that observed in 1886 to fermentation. In the "Fifth Annual Report of the New York Agricultural Experiment Station," he says, "The fermentive action is evidently not begun until the resistance of the living tissues is greatly reduced or entirely lost. This may be brought about in several ways. All fruit reaches this condition of inability to resist the inroads of disease-germs, or of germs of disintegration, when it becomes fully ripe,—literally dead-ripe. The condition may be prematurely brought on by anything which decreases the vigor of the plant, and thus enfeebles and shortens the life of its ripening tissues. A marked, and from several points of view an interesting, example of the early and extensive rotting of ripe fruit in plants constitutionally debilitated by propagation for three seasons from seed successively selected from the feeblest plants of the preceding year is recorded by Mr. Goff, in which finally half the ripe fruit prematurely rotted. This kind of decay is very appropriately called 'soft rot,' and is well described by Mr. Goff as follows: 'The fruit becomes soft, and collapses without changing color; the skin finally bursts, permitting the contents to flow out, when it dries without detaching itself from the stem.' If the fruit rests upon the ground it often cracks open, and the exposed surface becomes speedily covered with a white, velvety growth, composed of yeast and *Oidium lactis*, which for a considerable time prevents the contents from escaping. This white growth, with the associated bacteria, is only a more obvious development of the active agents of fermentation which destroys the fruit."

Dr. Arthur insists upon the necessity of discriminating between the "soft rot" of ripe fruit and the other kinds which chiefly affect green fruit, and suggests that one means of avoiding the former "is to maintain the health and increase the vigor of the plants by judicious breeding."

**Botanical News.**—Fascicle V. of Millspaugh's "American Medicinal Plants" was delivered to subscribers a month or two ago. Like the preceding fascicles, this one contains thirty plates, all of which are well done.——Professor Penhallow's "Mechanism of Movement in Cucurbita, Vitis, and Robinia" ("Proc. and Trans. Royal Soc. of Canada," vol. iv., 1886) treats of the tendril-movements of the first and second, and leaf-movements of the last. Three plates accompany the paper.——The "Additional Notes upon the Tendrils of Cucurbitaceæ" (*Can. Record of Science*, October, 1886), by the same author, continues the work in the order mentioned. Twenty-two species belonging to nine genera were under observation. The principal inquiry in this paper was that relating to the strength of tendrils, or of the spirals which they form.——B. D. Jackson gives an account, in the March *Journal of Botany*, of the new "Index of Plant Names," now under way. It is the intention to make a complete index of all genera and species of Phanerogams, so as to give "a view of the actual state of botany at the end of 1885."——The principal article in the March *Botanical Gazette* is one by Dr. Gray on Delphinium. It is an "essay at a rearrangement of our species," and is submitted in the hope of eliciting from botanists such observations and criticisms as will either confirm or invalidate the characters used.

## ENTOMOLOGY.[1]

**The Joint-Worm in New York.**—Twenty-five years ago *Isosoma hordei* did a great amount of injury to wheat, barley, and rye in this State; in some localities the yield was reduced fully fifty per cent. But during recent years this insect has attracted almost no attention. The present generation of farmers do not even know the characteristic signs of its ravages. There are, however, indications that the causes that have kept it in check, whatever they may be, are ceasing to be effective. And it is more than probable that unless care is exercised by the grain-growers of the State, there will be a repetition in the near future of the great losses of a quarter-century ago. The insect has already become very abundant in the northern part of Tompkins County. But I am not aware that the farmers even suspected its presence until their attention was called to it at a recent farmers' institute. The proprietors of a paper-mill at Ithaca have found that the straw received from certain localities is unfit for making paper, owing to the solidification of considerable portions of it by the injuries of this insect. In one lot of straw received from

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[1] This department is edited by Prof. J. H. COMSTOCK, Cornell University, Ithaca, N. Y., to whom communications, books for notice, etc., should be sent.